

THE CHEMIST

August, 1958

VOLUME XXXVI

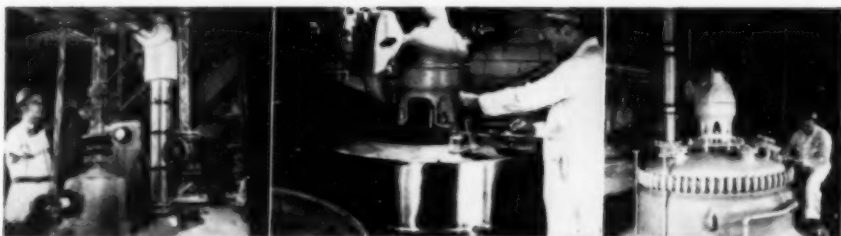


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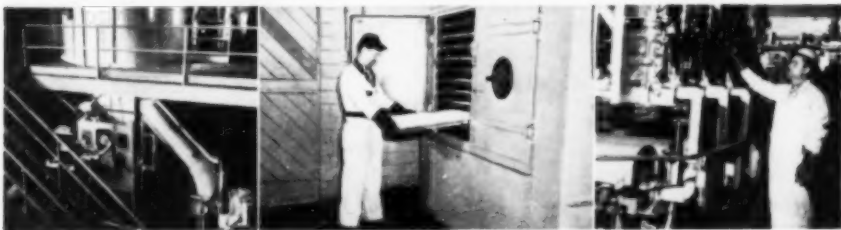


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Dr. W. T. Read, Hon. AIC
Receives Honor Award of Washington AIC Chapter.
(See Page 375)



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Vol. XXXV

August, 1958

Number 8

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Deadlines for The Chemist

The deadline for the October issue of *The Chemist* is September 10th. Advertising copy for October should be received not later than September 15th.

THE AMERICAN INSTITUTE OF CHEMISTS does not necessarily endorse any of the facts or opinions advanced in articles which appear in *THE CHEMIST*.

IN THIS ISSUE

Editorial:	
How the Professions Appear to a Sociologist	373
Special AIC Announcements:	
AIC Social Hour in Chicago	374
Committees	374
Chicago Chapter Officers	374
Pennsylvania Chapter Elects	374
Our Successors, Dr. W. T. Read, Hon. AIC	375
Army Chemical Research, Maj. Gen. William M. Creasy	376
Presentation to W. T. Read	382
About AIC Members	383
Understanding the Creative Process (Conclusion of series),	
Dr. Maurice J. Kelley, F.A.I.C.	385
Communications:	
A Collapse of Physics?	393
On Confidential Relationship	393
Wonderful Article	393
Please Note	394
One of the Best	394
Appreciated	394
For Your Library	395
Opportunities	396
Council	397
Items of Interest	399

TO COME IN SEPTEMBER

Stimulating articles are scheduled for this first Fall issue. • Bernard E. Schaar, chairman of the board, Schaar & Co., Chicago, Ill., explains why it is not pure luck when chemists make unexpected discoveries. • Dr. Otto Eisen-schimi, F.A.I.C., the realist, offers a program, not only to attract youngsters to the scientific professions but then to hold their interest in their careers. • "Motion Pictures as a Tool for Teaching Chemistry," by True Boardman, vice president, John Sutherland Productions, Inc., Los Angeles, Calif., is one of the excellent papers presented at the 35th Annual Meeting.

Recommended Suppliers and Services

Norman Applezweig Associates	384	The Lento Press	397
J. T. Baker		John J. Levenson Jr. & Associates	394
Chemical Co.	Inside Back Cover	Arthur D. Little, Inc.	392
Bios Laboratories, Inc.	398	Molnar Laboratories	399
Food & Drug Research Laboratories	396	Phoenix Chemical Labs	384
General Chemical Div.,		Lucius Pitkin, Inc.	399
Allied Chemical	Inside Front Cover	Robinette Research Labs	387
Gordon & Campbell	392	Rosner-Hixson Labs	374
Harchem Div.,		Foster D. Snell, Inc.	383
Wallace & Tiernan, Inc.	372	R. Steckler Labs	398
Johns-Manville	369	Truesdail Laboratories	400
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EDITORIAL

How the Professions Appear to a Sociologist

AIC members have considered many aspects of professionalism while working to advance the status of chemists and chemical engineers. It may help to spark ideas or to gain perspective by stepping out of our own field for a moment to see how the professions as a whole appear to a sociologist. We are given this opportunity through an abstract of a talk made by Gregory P. Stone, instructor, Department of Sociology, University of Minnesota, when he was the guest speaker at a meeting of the Twin City AIC Chapter. His topic was "Professions, Professionalization, and Personal Insecurity."

"It is difficult to define a profession because: (1) Occupational functions of professions are heterogeneous; (2) some professions have become highly specialized; (3) 'mystery' is cultivated by the professional; (4) professionalization has become a general social movement.

"However, five characteristics of a profession may be singled out because of their analytic utility: (1) Each profession is a community; (2) it is a community without physical locus; (3) it has a code of ethics usually formalized; (4) it is peculiarly able to maintain its identity as a community; and (5) the public image of the professional differs from that of his colleagues and imposes peculiar restraints upon his conduct or demeanor.

"These characteristics combine to give a profession relatively high prestige or status, considerable power, and a relatively high income. As a result, professional status is desirable. Professionals are in demand as employees

of corporations and other bureaucracies, and the professional identity is sought after by members of non-professional occupational groups.

"This cultivation of the professional by corporate enterprise and government bureaucracy, together with the persistent and successful appropriation of professional identity by the members of one-time non-professional occupations is a significant social movement in contemporary life which may be called professionalization. The movement is currently gaining momentum rather than abating. It is manifested in: (1) An increase in numbers of professionals in the labor force; (2) an increase in numbers of professional occupations; and (3) the persistent proposal of professional claims by whole occupational groups without established professional status.

"One of the effects of professionalization has been to set up dilemmas and strains in the established professions which make for personal insecurity. When such insecurity becomes socialized, as seems to be the case today among certain professional groups, we can expect the established professions to respond by joining existing social movements (perhaps non-professional in character), establishing new social movements of their own, or focusing existing professional organizations more sharply on the problem of offsetting such pressures."

Thus it would seem that to an observer the professions may appear differently than they do to someone within the professions themselves. This new perspective may increase our appreciation of our truly professional position, or it may spark productive ideas to increase public appreciation of our professions.

Special AIC Announcements

AIC Social Hour in Chicago

AIC members and guests who are attending the Fall meeting of the American Chemical Society in Chicago, Ill., September 7-12, are cordially requested to come to an AIC Social Hour, to be held at The Sheraton-Blackstone Hotel, Monday, September 8, from 5 to 7 o'clock. David W. Young, F.A.I.C., secretary of the Chicago AIC Chapter, will be our representative to handle the late sale of tickets for this event.

Chicago Chapter Officers

The Chicago Chapter announces that the following officers will serve for the fiscal year 1958-1959:

Chairman, Albert S. Henick,
Quartermaster Food & Container
Institute, 1849 West Pershing Road,
Chicago 9, Ill.

Chairman-elect, Clark E. Thorp,
Manager, Chemistry & Chemical
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search Foundation, 10 W. 35th St.,
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tion, 10 W. 35th St., Chicago 16, Ill.

Secretary, David W. Young, Assistant
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Box 431, Whiting, Ind.

National Council Representative,
Bernard E. Schaar, M.R. Box 436,
Chesterton, Ind.

Committees

The AIC Committees for 1958-1959 are listed in the July issue of THE CHEMIST (p. 342), except for

the Membership Committee. We are happy to announce that Dr. Lawrence T. Eby of the Enjay Co., Inc., Elizabeth, N. J., will continue as chairman of the Membership Committee. The names of the other members of this committee will be announced as soon as they have all accepted their appointments.

Pennsylvania Chapter Elects

The Pennsylvania Chapter has elected the following officers to serve for the 1958-1959 fiscal year:

Chairman, Dr. James L. Jezl,
Sun Oil Co., Marcus Hook, Pa.

Vice chairman, Dr. William Langeland,
Wyeth Laboratories, Radnor, Pa.

Secretary, Dr. Ezra Bitcover,
Eastern Utilization Research Labs.,
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Our Successors

Dr. W. T. Read, Hon. AIC

Consultant, 1225 13th St., N.W., Washington 5, D.C.

(Presented when the author received the 1958 Annual Honor Award of the Washington AIC Chapter, March 18, at the Windsor Park Hotel, Washington, D. C.)

THE name of our official publication, *THE CHEMIST*, is particularly appropriate. It represents the chief aims, purposes, and ideals of *THE AMERICAN INSTITUTE OF CHEMISTS*. Naturally we are all interested in chemistry as a science and as a means of advancing industry and national security. The *INSTITUTE*, however, is primarily organized and operated for all chemists.

The AIC is not a large organization. Neither is a catalyst bulky in terms of the substances whose reactions it influences. The *INSTITUTE* has always functioned as a catalyst. Its members are leaders, key people in the profession, who have operated quietly, modestly, but very effectively in many ways for the benefit and advancement of chemistry.

With these two ideas before you, I come to the theme, *Our Successors*. To do justice to the subject, an hour would be too short, and it could serve as the subject of a large symposium. I shall ask but two questions without attempting to answer them. Rather, the answers are left to all who make up the *INSTITUTE*; personal and individual answers which we will be making as long as each one of us is active in the chemical profession.

The first question is, "What Sort

of a profession are we making and leaving to our successors?" I do not speak of advancement and proficiency in the science of chemistry, but rather to the qualities which characterize members of the *INSTITUTE*. These include kindness, mutual understanding and appreciation, unselfish willingness to help each other, and a sense of unity in service to our fellow citizens and the nation.

Only the older chemists fully appreciate what the depression of the decade 1930-1940 meant. While the percentage of chemists out of work was small, the experience was just as tragic to the individual as if there had been wholesale unemployment, and even more so if misfortune carried with it the feeling of failure. A great deal was done by those of the profession who were in positions of security for those who were temporarily unemployed, and in this work the *INSTITUTE* had a large share. The problems of the future may be very different, but in the uncertain and trying state of world affairs, there will be problems for our successors, who deserve to have bequeathed to them a strong and thoroughly human profession.

My second question is "What are the sources from which our succes-

sors will come?" This question is the subject of many addresses, long articles in newspapers and magazines, numerous conferences, and much discussion in Government circles. Whatever is done, improvement in the situation will be slow. The students in senior high school have already made their choices, which include very little science and mathematics. A small group possibly can be salvaged and put on the right track, but not many. Our hope lies in the children in the elementary school and those about to

enter junior high school. All the plans and devices and money will not be enough. What is needed is the individual efforts of scientists and engineers.

You will have adequate successors only as you individually and personally participate in discovering the latent talents of these children, and by believing in them and by taking an interest in them, you may encourage and inspire them to become worthy successors. System and organization are necessary, but have value only as they are supported by people, by ourselves.

Army Chemical Research

Maj. Gen. William M. Creasy

Chief Chemical Officer, Chemical Corps, U.S. Army, Washington, D.C.

(Presented when Dr. W. T. Read received the Honor Award from the Washington AIC Chapter, March 18, at the Windsor Park Hotel, Washington, D. C.)

THE ARMY has some sixty research and development installations and facilities scattered around the country. In some places chemistry may occupy a minor part of the program; in others it is a major part of the research effort. Not one single modern weapons system would function without the many valuable products of the chemical industry.

While the name Chemical Corps would connote that our work is devoted exclusively to chemistry, actually, purely chemical activity is only one part of our program, and we are concerned primarily in the application of chemistry to the development of munitions systems and production.

Both the Quartermaster Corps and Ordnance Corps have major programs in the field of chemical research and development. For example, the Chemical and Plastics Division of the Quartermaster Research & Development Center, at Natick, Mass., in cooperation with industry, is concerned with a wide variety of products designed for the protection, comfort, and improvement of the efficiency of troops. Examples: fungicides, rodenticides, flash burn creams, chemical heating devices, and others.

The Ordnance Corps is actually the largest user of chemicals in the Army. It uses chemicals in such things as propellants and explosives,

ARMY CHEMICAL RESEARCH

cleaning and preserving compounds, fuels and lubricants. Chemicals figure largely in many of the special products with which Ordnance is concerned. For example, a non-metallic mine may contain a wide range of components made of polystyrene, phenolic resins, glass with vinyl type coupling agents, and epoxy adhesives. Pyrotechnic devices may contain polyester resins, epoxy resins, polyethylene, and nitrile rubber.

Guided missiles may contain a whole range of chemical products. An ordinary artillery shell may be composed of such components as polyethylene, phenolic resin, cellulose acetate and butyrate, and others.

We find chemical products in our vehicles, in all of our weapons and weapons systems; in propellants, and in the many types of paints and protective coatings for equipment . . . Just since the Korean episode, many new technological frontiers have been crossed both by the chemical industry and the military services. The industry has not only created new products for new uses, but by its ingenuity, spurred by defense needs, has found many substitutes for foreign products. This serves to decrease our dependence upon other nations in time of war when our supply lines become uncertain.

New frontiers are ahead of us in chemistry. The search for propellants to power missiles is pointing the way to greater fuels. Man's mind now

seems to be set upon the conquest of outer space. If we succeed in propelling ourselves out among the stars, we must have propellants of greater power than we perhaps can now imagine. We are catching up with Buck Rogers, who solved the problems of space travel many years ago. There is a saying that man can do anything that he has the power to imagine that he can do. We seem to be keeping pace with our imagination.

Much of our progress in the chemical field has stemmed from the close working relationship between scientists in our military laboratories, and those in industrial and academic laboratories. To obtain the greatest results, it would be impossible as well as uneconomic for all Army research projects to be conducted in Army installations and by Army employees. Consequently, it is the policy to take fullest advantage of the great variety of skills, knowledge, and facilities existing outside the military establishment by assigning projects under contract to commercial organizations, research foundations, and educational institutions.

The Army Chemical Corps has depended heavily upon industrial firms and universities for much of its research. We have received a great deal of voluntary advice and suggestions from industrial and academic scientists which have materially aided in the development of ideas and equipment. We are now receiving material

assistance from the chemical industry in our search for new agents.

In 1951 one of our chemical advisory committees recommended that the search for and collection of information from industries and universities be put on a systematic basis. Accordingly, we have established an industrial liaison program in which the aid of industry is being enlisted in our efforts to find new chemical compounds, processes, and information which may be used in our research work on chemical warfare agents, as well as information for other research programs of the Army Chemical Corps.

General areas of interest in the program include compounds of a highly lethal nature and those having marked convulsant, sedative or incapacitating action. In the same general category are compounds which will produce physiological effects so unpleasant that personnel will be unable to carry out their assigned duties and will have to seek immediate protection. Another group, about which the Chemical Corps is seeking information from industry, includes compounds which have therapeutic or prophylactic value counteracting the effect of chemical warfare agents.

The Corps is also interested in substances, compounds or mixtures which have specialized properties such as gelling, thickening, incendiary, decontaminating, and smoke producing. A fourth group includes information

concerning detection of chemical warfare agents and nuclear radiation and the protection and decontamination of personnel or material exposed to their effects. We expect to broaden the program to include biological agents and other fields.

Now in the files of our Industrial Liaison Office at the Army Chemical Center is information concerning over 2000 chemical formulae, suggestions, and ideas, representing millions of dollars worth of research that the chemical industry has submitted to the Army Chemical Corps. More than 300 of the nation's 3000 industrial laboratories are cooperating with the program. Some companies are submitting monthly lists of newly prepared compounds along with biological data. Others are opening their chemical and biological files to Chemical Corps representatives. We hope in time to broaden this program to include the majority of the nation's industrial laboratories.

I come now to a subject which has been of considerable concern to us. Many times in our discussions of the measures which must be taken to prepare this country for adequate defense against the possible employment by an aggressor of chemical and biological warfare weapons, we encounter reactions which stem from emotional rather than realistic thinking. This has been a major handicap in achieving proper understanding of the nature of these agents. The press has

ARMY CHEMICAL RESEARCH

had a tendency to nurture misunderstanding by its inability to resist the temptation to describe the agents of chemical and biological warfare in sensational terms. Too often, logical considerations are clouded by sensationalism with resulting conclusions that such methods of waging war are too horrible to contemplate and therefore will not be used against us. To put such thinking in its proper perspective, we should add: "Of course they are horrible, as are all means of killing our fellow man. War, however waged, is horrible."

Chemical and biological weapons do not produce pleasant results to people on the receiving end, but the word "horrible" can be a relative term. While these forms of warfare do produce illness, suffering, or death, a selection can be made by the user. They do not leave in their wake an aftermath of maimed, helpless cripples doomed to life-long suffering, nor do they reduce churches, homes, schools, hospitals, and factories to smoking piles of dead rubble. But with or without horror, the choice as to whether they will be used, or in what degree, does not currently rest with us but with other peoples and other governments.

We do not like to be reminded of unpleasant things, and anything having to do with war is unpleasant. No one in this country wants war, and that goes for the military possibly more so than for civilians. There is

too great a tendency, however, to say, "It can't happen here," and forget about the whole thing. This is the most dangerous type of thinking imaginable. We need the type of thinking that leads to action; that considers all possibilities and calls for the type of action which will produce a military posture sufficiently strong to discourage would-be aggressors.

Personally, if I had the choice of which weapons I would be attacked with, I would infinitely prefer those of the chemical and biological variety to those of the nuclear type. There is little defense against the blast and burn of the atomic or hydrogen bomb. There are means of protection against chemical and biological weapons if people are trained in their use, and have available to them what is needed, as masks, antidotes, and other protective equipment and material.

Chemical and biological warfare have not been employed in recent wars, but this is no guarantee that it may not be used if there should be future wars. Historically, chemical warfare has demonstrated its military worth. It was used extensively and effectively in World War I. Nearly one-third of AEF casualties were caused by toxic chemicals. Great strides have been made since in the development of new agents which are many times more toxic than anything used in World War I.

The United States did not use this type of warfare in World War II.

At the outset we announced that chemical warfare would be used only in retaliation for similar attacks upon ourselves. We must view with extreme seriousness the grim possibility that the Soviets would not hesitate to use chemical and biological weapons in a general war, if it would best serve their objectives. We have ample warning to this effect from Soviet leaders.

In our intense preoccupation with nuclear war, guided missiles, and sputniks, we must also give attention to the measures which should be taken to place this country in a position to meet the possibility of chemical and biological attack . . .

Two important factors must be considered:

(1) National policy favors the use of nuclear weapons as deterrents. However, the tremendous forces unleashed with the detonation of nuclear devices makes one pause to consider: "Will these weapons be used in war?" "When and if there is nuclear parity or sufficiency, would an atomic war of attrition be profitable to either side?" With each side being sure of enormous devastation with the use of nuclear weapons will either, in fact, resort to such a type of warfare? Suppose through agreement, which we will abide by, nuclear warfare is outlawed. What then? What worthwhile weapons would be available to an enemy for use with present and anticipated airframes and missiles? High explosives could be used, but would

they be completely effective? Can we still think in terms of 1000 plane raids? It is generally accepted that such things are of the past. We must anticipate then that an enemy may conclude that chemical and biological weapons, possibly radiological agents, would be the only worthwhile cargoes for airframes and missiles.

(2) If war should come, we could expect it to come suddenly. An aggressor nation might gamble on a quick preemptive blow in the hope that it would leave us powerless to retaliate. In such case, if nuclear weapons were not outlawed, we could expect that chemical and biological weapons might be used along with the atomic variety.

We must not lose sight of still another factor. Chemical and biological weapons do not destroy property. An aggressor might wish to preserve those parts of our industrial complexes which might be most useful to him in the event of conquest. He could do this by removing the human element with chemical and biological warfare without destroying buildings and machinery. In preparation for general warfare, it is not inconceivable that biological agents might be used in advance of an actual attack to weaken our people . . . These are ideal tools for the saboteur as they can be easily and inconspicuously transported and disseminated through food and water supplies, through ventilating systems of factories, and by other means. It

ARMY CHEMICAL RESEARCH

would be easy for enemy submarines to stand well off shore and let biological agents loose on winds blowing toward land. Since it requires days even to be aware that a biological attack has been made, the submarine could be in safe waters before the alarm was sounded.

About Dr. W. T. Read

Bill Read, deservedly honored, enjoys many unique distinctions. Before I tell you about him, I should point out that credit must also go to Mrs. Read, who has a degree in chemistry and is an extremely competent scientist in her own right. Among many things which Bill owes to Mrs. Read is his doctor's degree. It is whispered that she did some of his research work!

Bill probably also attributes the success he has achieved in his career to the fact that he was born in Texas. He not only claims citizenship in Texas, but more particularly he is a citizen of Texas A & M. He was born there while his father was a surgeon at the school.

Among the many distinctions Bill can claim is that he is an alumnus of the Chemical Warfare Service, having served there four months as a first lieutenant during World War I. He was one of the original team which worked with Lewis in the development of Lewisite.

Bill enjoys distinction not only as a scientist but as an educator. He has throughout his career taken an intense

interest in educational matters, particularly in the field of scientific education. Twenty-seven years of his career have been devoted to teaching.

He was prominent for many years before World War II in college and university circles in the Southwest. At one time he was head of the chemistry department of Texas Tech. Although few may have heard of this school, it will undoubtedly be better known in the future. Its football team has just been admitted to the Southwest Conference.

When he retired in October, Bill was one of the senior and most valuable hands in the Army research and development shop. He started with it when it was a small organization known as G-5, and continued with it until his retirement. During his years of service there he had a great deal to do with formulating policies in connection with the exchange of scientific and technical information. One of his most valuable attributes was that he could get things done because he knew who could do them. Many times, when knotty problems arose, Bill could pick up the phone and call on one or more of his many friends among the scientific fraternity and get a quick answer.

Bill liked to have information at his fingertips. As a result he was the bane of existence to those people in the Pentagon who are responsible for seeing that files are kept in orderly shape and in the fewest number. Bill's files

went back to his first days with the Army and contained everything about everything. He had his own filing system and only Bill knew what was in his files. I understand that word quietly went out that the files he left behind were to "administratively" disappear when his old office moved to Fort Belvoir recently.

At one time I was privileged to be associated with Bill in the Army research and development office for a period beginning late in 1946. Back that early we had a directive calling for the development of missiles and anti-missiles. These were mostly in the idea stage at that time and it has taken these years of concentrated effort to translate somewhat fragmentary ideas to the missiles which we can put into the air today.

Without detracting one iota from the credit due Bill, I should like to point out, and Bill will agree with me, that in the Government today there are other Bill Reads almost without number. They constitute a body of dedicated, patriotic and extremely capable people who have chosen to serve their country rather than seek possible greater monetary reward in industry. The contributions that they have made to our health, comfort, material wealth, and defense cannot be counted. Their work seldom makes headlines, and few receive honors. Many are not even well known in their own establishments. But you could not possibly measure the benefits which have accrued to practically every segment of our daily life because of their efforts.

Presentation to W. T. Read

THE Honor Award of the Washington AIC Chapter was presented to Dr. William Thornton Read, Sr., Hon. AIC, consultant, 1225 13th St., N.W., Washington 5, D.C., at a meeting held March 18, 1958, at the Windsor Park Hotel, Washington D. C.

Preceding the dinner, a "Fellowship Hour" was sponsored by Beckman Instruments, Inc. Dr. Carl J. Wessel of the National Research Council, chairman of the Washington Chapter, acted as master of ceremonies. The award was presented to Dr. Read by Dr. Henry B. Hass, presi-

dent of the Sugar Research Foundation, New York, N. Y., who was then the AIC president. Dr. Read's acceptance address was entitled, "Our Successors."

The invitation address was made by Maj. Gen. W. M. Creasy, chief chemical officer, Chemical Corps., U. S. Army, Washington, D. C., who spoke on "Army Chemical Research," with concluding remarks about Dr. Read, who retired last Fall as chemical consultant to the Department of the Army. (See preceding pages for talks given at this meeting.)

Dr. Read's activities have included

many services to the chemical profession. He is a past chairman of both the New York and Washington Chapters of the AIC. He has served as AIC vice president and councilor, and has been active on many committees. During the 1930's, he served on the Chemists' Advisory Council. For many years, he has encouraged science talent in the secondary schools of greater Washington.

The citation on the Honor Award reads:

**To
Dr. William Thornton Read, Sr.,**

in recognition of

His meritorious contributions to the chemical profession as teacher, author, civilian and military scientist, and his energetic service to The American Institute of Chemists

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About AIC Members

C. W. Hoerr, F.A.I.C., senior research scientist, Armour & Co., Chicago 9, Ill., is general chairman of the 32nd annual fall meeting of the American Oil Chemists' Society, to be held Oct. 20-22, at the Sherman Hotel, Chicago, Ill.

Dr. Harvey A. Neville, F.A.I.C., provost and vice president of Lehigh University, Bethlehem, Pa., announces that new courses in "Instrumentation-Transducers" and "Instrumentation Principles" have been added to the chemistry curriculum.

Dr. Walter J. Murphy, Hon. AIC, editorial director of the A.C.S. Applied Journals, Washington, D.C., will speak at the 30th Annual Meeting of the Association of Consulting Chemists & Chemical Engineers, Inc., to be held at the Biltmore Hotel, New York, N. Y., Oct. 28, 1958.

Albert P. Sachs, F.A.I.C., consulting chemical engineer, New York, N. Y. is visiting in England, Italy, and Switzerland. His trip also includes the 2nd Congress of the European Federation of Chemical Engineering and theACHEMA Congress, Frankfurt, Ger.

Ralph Wechsler, F.A.I.C., president, Nopco Chemical Co., Harrison, N. J., presented awards to forty employees who joined the company's 15-25 Year Club, May 20th.

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Joseph K. Roberts, F.A.I.C., vice president for research and development, Standard Oil Co. (Indiana), announces that Wayne A. Proell was named division director in the research department.

R. Lindley Murray, Hon. AIC, board chairman of Hooker Chemical Corp., Niagara Falls, N. Y., and T. E. Moffitt, president, recently announced the merger of the former Shea Chemical Corporation into Hooker, and the change of name from Hooker Electrochemical Co. to Hooker Chemical Corporation.

Dr. Jasper H. Kane, F.A.I.C., vice president and director of research and development, Chas. Pfizer & Co., Inc., New York, announces that the company has launched a biologicals research program at its new center near Terre Haute, Ind.

S. Fisher Gaffin, F.A.I.C., of J. T. Baker Chemical Co., New York, N. Y., is treasurer of the New York Section of the American Chemical Society.

Dr. Lawson V. Peakes, Jr., F.A.I.C., has accepted a position as associate professor of chemistry at Berry College, Mount Berry, Georgia.

William Abramowitz, president, Carlon Products Corp., Cleveland 5, Ohio, announces that John I. Rudge has been elected a vice president responsible for the Southeastern District, with headquarters at Asheville, N. C.

American Instrument Co., 8030 Georgia Ave., Silver Spring, Md., announces the first American made vacuum thermal balance, the "Thermo-Grav," developed with **Dr. Saul Gordon, F.A.I.C.**, and Clement Campbell, consulting chemists of Morristown, N. J.

Dr. Charles G. Overberger, F.A.I.C., head, Department of Chemistry, Polytechnic Institute of Brooklyn, N. Y., is chairman-elect of the New York Section of the American Chemical Society.

(Continued on page 392)

Understanding the Creative Process

Dr. Maurice J. Kelley, F.A.I.C.

Director, Industrial Specialties Laboratories, Nopco Chemical Co.,
Harrison, N. J.

(This paper completes a series which began in THE CHEMIST in Nov. 1957,
and was continued through March 1958.)

Part VI. Operational Techniques of Creative Thinking

ALL of these techniques are based on, and assume the establishment of, the basic atmosphere necessary for good creative thinking:

(1) A positive, permissive attitude in which judgment is outlawed for the time being.

(2) The encouragement of as many ideas as possible, no matter how "crazy." Charles S. Whiting has described the devices developed therefor as the "operational techniques of creative thinking."¹ His classification is used in Table 11.

The first use of the checklist as a modern creative thinking tool is credited to Osborn, and this tool is most effective in searching for a solution to a specific problem. The checklist serves to recall areas which might otherwise be forgotten. However, the checklist make-up relies on points of past experience, and may not include all the important areas for a new current problem. The checklist also asks many questions which are not relevant, and to that extent tends to waste time. Sharp describes checklists as "idea

Table 11.
Operational Techniques
Of Creative Thinking

Analytical

(questions elements, changes, eliminations, etc.)

Checklist. Osborn, BBD & O

Attribute Listing. Crawford, Univ. of Nebraska

Input—Output. General Electric

Forced Relationship

(best for mere ideas, especially for artistic or literary fields)

Listing

Catalog

Focused Object. Whiting, McCann-Erickson, Inc.

Free Association

(the laws of: similarity, contrast, contiguity)

Brainstorming. Osborn, BBD & O

Gordon. Gordon, Arthur D. Little, Inc.

Phillips 66. Phillips Petroleum

needlers."²

The technique of attribute listing is credited to Prof. Robert Platt Crawford of the University of Nebraska. By this method, one lists all the properties or qualities of an article or product that he can think of. He

1. Whiting, Charles. "Operational Techniques of Creative Thinking." *Adv. Mgmt.* **20**, 24-30 (Oct.) 1955.

2. Sharp, H. T. "Here's How to Get Ideas in a Hurry." *Chem. Eng.* **63**, 218 (July) 1956.

then goes on to consider what changes, if any, could be made in any of the properties or attributes. This technique is especially valuable for ideas on product improvement.

The Input-Output technique has been developed and extensively used by General Electric Company. This method focuses attention on the job to be done, the energy involved and the limiting requirements; hence is best for engineering problems.

Forced relationship techniques rely on establishing by mechanical or arbitrary means the consideration of two ideas in juxtaposition. This initial forced relationship starts a series of free associations which suggest new ideas. In the listing technique, one makes his own list of starting ideas, and considers each one in relation to each of the others. In the catalog technique, a large already-existing tabulation (such as a Sears-Roebuck catalog, telephone directory, dictionary, etc.) is examined and ideas selected at random are considered together. When one of the ideas, or objects, is deliberately selected and associated with other random ideas, Whiting calls the technique "Focused Object."¹

Brainstorming

Coined by Alex F. Osborn who originated the technique, the word brainstorming connotes the storming, commando fashion, of the creative problem by the brains in the attacking group. Brainstorming has been defined as group ideation, uninhibited think-

ing, a problem-oriented "bull session." Says Osborn's partner in BBD & O, Willard Pleuthner, "Brainstorm sessions are 100% creativeness—production of idea after idea—you just ideate positively."³

Some of the intermediate objectives of the brainstorm technique are:

- (1) to release the imagination from the restraints of judiciousness, conformity, fear
- (2) to seek improvements in ideas just expressed by others
- (3) to seek combinations of ideas just expressed by others

Elmer C. Easton, dean of engineering at Rutgers, stresses the "cross-fertilization" of ideas.⁴ Enthusiasm becomes contagious, and a spirit of friendly competition is engendered, in the attitude of "Can you top this?"

The brainstorm session usually involves a group of 5-12 people, and preferably of 8-12 people of similar interests but varied skills and background. The session is presided over by a chairman, and there is a provision for recording in brief the ideas that come forth. Authors differ as to whether the subject or problem should be announced before the meeting. One author suggests a 48-hour written notice, including a statement of the problem and a couple of typical examples of answers.⁵ Whenever the

3. Pleuthner, Willard. "Brainstorming: A Method for Developing Creative Engineering Ideas." *Machine Design* **28**, Jan. 12, 92-4, 1956.

4. "Freedom to Dream." *Ind. Eng. Chem.* **47**, sup 7a (Mar.) 1955.

5. Bittel, Lester R. "Brainstorming: Better Way to Solve Plant Problems." *Factory Mgmt.* **114**, 98-107 (May) 1956.

problem is stated, it must be simply stated—too many facts stifle spontaneity. If the problem is complex, it may be better to break it up into component problems and hold separate sessions on each sub-problem.

Only ideas are allowed—no judgment or criticism. Free-wheeling is welcomed; the wilder the ideas the better. This encourages quantity, which is desirable because quantity increases the chances of big ideas. All ideas are recorded, and are also written down in brief on a blackboard. No individual credit is given for ideas; any success belongs to the entire group. Anyone who can't refrain from criticism must retire from the session—he may be a valuable man on the evaluation team. One quickthinking chairman quieted a criticizer with the warning, "Think up, or shut up!" The chairman should also be alert to thwart idea-selling, the comedian, and the appearance of fatigue. The latter should end the meeting. Ordinarily, brainstorm sessions are short, an hour or less, and can be counted on to generate about 85 ideas in every 15 minutes.

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Brainstorm sessions should not be used for one-answer problems (which are usually not creative problems anyway), nor for problems where a lot of pencil work is needed. Some of the rules for brainstorm sessions are given in Table 12.

Table 12.

Brainstorming Rules

1. Must keep these sessions entirely apart from other conferences.
2. Informal, positive, permissive atmosphere.
3. Judicial thinking and criticism are forbidden.
4. Use blackboard for visual as well as auditory stimulation.
5. Record what was said, in brief reportorial style; not who said.
6. 8 to 12 people is best number; varying backgrounds desirable.
7. Use ball or red disc to signal infraction of Rule 3—"Three strikes, and you're out!"
8. Announce subject before meeting—authorities differ on this.

The ideas resulting from a brainstorm session are typed up (some firms collect afterthoughts the next day also, and add them to the list) and distributed to the session members—and are also sent to the evaluation group for their critical judgment one or two days later. This evaluation group is usually composed of different people than the brainstorm group, at least in part. The evaluation group selects the 8-10 best ideas, and may add more data on these. Almost always they will include an estimate of costs, and frequently will authorize some type of preliminary survey. By this time,

the number of ideas still under consideration may have been narrowed still further. These ideas and proposed programs are then presented to the boss, and followed through for executive decision and ultimate practical results.

It should be realized that the brainstorm session usually does not fully solve a problem—the session is a technique for stimulating creative ideas. Brainstorming can even be done by a single person, but remember not to evaluate until some time later.

It has also been stated that brainstorming improves human relations 100%,⁶ and is stimulating and developing to the people who take part in them.⁷ Executives may have trouble at first in brainstorm sessions, because they place such a high value on judgment that it is hard for them to let loose.

Phillips 66 Buzz Sessions are just simultaneous multiple brainstorm sessions. For example, 5 sessions of 10 members each will simultaneously brainstorm the same problem. Right afterwards, each group then selects its own best ideas, and each chairman presents these to the entire group.

The Gordon Technique

William J. J. Gordon of Arthur D. Little, Inc., developed this highly specialized technique, which has been

used with great success by that company's Design Synthesis Group. This group invents new products to order for clients, and so far has never failed to produce an invention satisfactory to the client.¹ The Design Synthesis Group consists of:⁸ Leader, production man, mechanical engineer ("designer"), industrial artists, chemical engineer ("sculptor"), model maker, liaison agent—who works afterward with the model maker, and the leader is a person of extraordinary importance to the success of the group, as we shall presently see.

The objective of a Gordon session is only *one* radically new idea, not the huge numbers of ideas sought in a brainstorm session; and it is deemed essential to withhold even the slightest expression of that idea until late in the session, by which time the idea will spring forth as the unanimous creation of the group. To promote this objective, the group leader is the only one to know the exact problem at the start of the session, and he does not reveal it fully until late in the rather lengthy session. Reasons for this are:

- (1) arriving at ideas too soon leads to superficiality.
- (2) arriving at ideas too soon encourages "ego-centric involvement"—favoritism for one's own ideas.

The initial subject for discussion is very carefully chosen by the leader,

6. "Ideas for Industry." *Steel*, **138**, 105-12 (Apr.) 1956.

7. Von Fange, E. K. "Understanding the Creative Process." *Gen. Elec. Rev.* **58**, 54-7 (July) 1955.

8. "New Creativity Gambits: How Management Can Fish for Dollar Ideas." *Chem. Week* **77**, July 23, 39-44, 1955.

UNDERSTANDING THE CREATIVE PROCESS

to be related to the general area of the actual problem and yet not reveal this problem prematurely. A very broad, deep discussion of the fundamentals of the underlying natural phenomena ensues. The leader gradually reveals some of the limiting factors and near the end of the conference, which usually lasts about three hours, the exact problem will have been defined.

The leader of a Gordon session must be exceptionally gifted, and trained in this particular technique. Because his importance is so great to the group, he is also a limiting fac-

tor in the effectiveness of the group. This method is not for neophytes. But it has had remarkable success in dealing with new scientific principles and applications thereof.

Actually, having trained his people in the principles of his technique, Gordon now feels able to relax the extreme formality of his procedure. Since the members of the group have learned the value of deferment, it is no longer necessary to hide the real specific problem and the role of the leader becomes less important. The men are able to moderate their own performance.⁹

Part VII. Results of Training in Creativity

It is well to inquire what has been accomplished so far by the recent impetus to deliberate creativity. After all, 99% of mankind's progress, which we have attributed to creative thinking, occurred before people paid much attention to the mechanism of the creative process.

We saw earlier that many firms and universities are actively engaged in creative thinking programs and studies, and the number is growing constantly. The mere fact of the continued acceptance of creativity programs by so many "hard boiled" American business giants is proof that these companies feel results are beneficial, even if it is hard to measure such results.

In the early thirties, General Electric's management became worried about the shortage of inventors, and they decided to do something about it. They started, and General Electric has been training selected employees in the Creative Engineering Program since 1936, to develop imaginative, resourceful, highly creative engineers. The Creative Engineering Program now runs for one year, and there are now five other courses in the GE Advanced Education Program. Classes are held during working hours, and rotating work assignments are made so as to be compatible with the courses. This involves a considerable

9. Gordon, William J. J. "Operational Approach to Creativity." *Harvard Bus. Rev.* 34, Nov.-Dec. p. 41-51, 1956.

investment of time and money by the company. What are the results? Inventiveness was greatly stimulated, and new concepts of management also resulted.^{10 11} General Electric has trained over 400 people in the Creative Engineering course to date, and has found that these men produce patentable inventions at three times the rate of other colleagues. Seventy-five per cent of these course graduates are now in management positions or in posts of high level technical responsibility. And GE's top management is continually seeking ways to spread more and more of the stimulating environment throughout the entire company.

Batton, Barton, Durstine & Osborn have been brainstorming more and more since 1939, and with great satisfaction on the part of their clients. In a recent month, BBD & O held 24 brainstorm sessions involving a total of 187 members of their staff.³ Osborn claims a 50% gain in mental function and creativeness by regular participation in brainstorm sessions.¹²

Arthur D. Little, Inc. is immensely satisfied with creative thinking approaches, and so are their clients, for ADL has never failed to solve an inventive problem which has been sub-

jected to the Gordon technique.

The 70 students who have taken Prof. John E. Arnold's M.I.T. course in Creative Engineering during the last five years, have been eagerly sought after, and 20 of them already have achieved high level jobs in industry.

Several firms have attributed annual savings in 6 and 7 figures, to "brainstorm" ideas on improved manufacturing.

Let us summarize, in Table 13, the results of emphasis on the understanding of the creative process, and on the actual training therein of more and more people.

Table 13.
Results of Training in Creativity

To the Individual:

1. Improved creativity.
2. A successful approach and method for deliberate creativeness.
3. Increased confidence in his creative ability.
4. Ability to control judicial functions.
5. Ability to scrutinize his own behavior in creative situations.
6. Improved human relations.
7. Realization that creativity training applies to all problems, people-problems as well as thing-problems.

To Business Organizations:

1. Greater inventiveness among personnel.
 2. Policy of flexibility in communication.
 3. Policy of permissive atmosphere.
 4. Balance between efficiency and creativity, and the means to achieve each.
 5. Balance between executive decision and deferred judgment.
 6. Emphasis on the future—and risking the status quo.
-

10. Hix, Charles F. Jr. "Planned Training—A Composite Method." *Machine Design* **28**, 96-8 (Jan. 12) 1956.

11. Hix, Charles F. & Kline, D. F. "What to Expect from an Advanced Educational Program." *Gen. Elec. Rev.* **39**, 38-9 (Nov.) 1956.

12. Osborn, Alex F. "Applied Imagination—Principles and Procedures of Creative Thinking." Book: Chas. Scribner's Sons, N. Y. (1953).

The Importance of the Individual Creative Person

The subject of creativity has received extraordinary publicity in trade and business publications during the last three years, with perhaps an overbalance of emphasis on group techniques and "gimmicks." The frequency of these articles has diminished in recent months, but not before some opponents have had their say.^{13 14 15} The pendulum, which a year ago was putting so much emphasis on special group techniques, has now swung back to a position of greater emphasis on the importance of the individual creative person.

The current view is well expressed by Herman S. Bloch:¹⁶ "Creativity is an individual function. It may be sparked by external contacts, it may be accelerated by group devices, but in the last analysis an idea must be generated by an individual. If an individual scientist is to be continuously creative, his individuality must be accentuated. He should be given an opportunity for individual initiative, be made aware of his individual responsibility, be provided with individual rewards for individual productivity. To the extent that he is permitted or forced to submerge his own personal-

ity, to lose his individuality as a member of a group, to become a faceless, voiceless part of a mass, to that degree will his creativity be stifled."

Dr. Alfred W. Griswold, president of Yale University, said at the June 1957 commencement, in connection with Yale objective to seek out talented individuals and to stimulate their gifts: "Could Hamlet have been written by a committee, or the 'Mona Lisa' painted by a club? Could the New Testament have been composed as a conference report? Creative ideas do not spring from groups. They spring from individuals. The divine spark leaps from the finger of God to the finger of Adam, whether it takes ultimate shape in a law of physics or law of the land, a poem or a policy, a sonata or a mechanical computer."

Alex F. Osborn says of creativity training: "It will never be a science, but it is an applied art, a teachable art, a learnable art, an art in which all of us can make ourselves more and more proficient, if we will." And as Jarman¹⁷ points out, the Western World is arrayed against potential enemies who are superior in numbers (quantitatively). If our ways are to survive, it can only be with superior thinking (qualitatively), especially in our leaders. Anything which promotes better thinking will help us win the struggle.

13. "Brainstorming: Cure or Curse?" *Business Week*, Dec. 29, p. 44-8, 1956.

14. Benson, Bernard S. "Let's Toss This Idea Up . . ." *Fortune* 56, Oct. p. 145-6, 1957.

15. Peterson, Wilfred A. "Groups Don't Create: Individuals Do." *Printers' Ink* 257, p. 25, Oct. 26, 1956.

16. Bloch, Herman S. "The Captive Professional Chemist." *The Chemist* 34, 414, 1957.

17. Jarman, B. H. "Can Executives Be Taught to Think?" *Adv. Mgmt.* 19, 5-8 (Jan.) 1954.

Application of Thermoanalytical Research Techniques — Thermogravimetry, Differential Thermal Analysis, Thermo-Volumetry — Development of Laboratory and Control Instrumentation

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Dr. Roger W. Truesdail, F.A.I.C., president, Truesdail Labs., Inc., Los Angeles, Calif., warns that the U.S. will lose science leadership if non-profit research institutes and universities engage in applied or business research rather than the basic or fundamental research for which they were founded.

Dr. Charles J. Marsel, F.A.I.C., Department of Chemical Engineering, New York University, New York, is co-author of a paper on "Polymers for High Temperature Service," presented at a conference of the American Institute of Chemical Engineers and the Chemical Institute of Canada. Useful polymeric materials with a heat resistance up to 1000°F are expected to be available within ten years.

Dr. E. M. Kipp, F.A.I.C., director of research, Foote Mineral Co., Philadelphia 44, Pa., announces that Dr. Spencer R. Milliken has been appointed research and development-sales staff coordinator.

Dr. Andrew J. Bartilucci, M.A.I.C., dean of the College of Pharmacy, St. John's University, Brooklyn, N. Y., has been appointed chairman of the Pharmacy Department.

Prof. A. J. Monte-Bovi, M.A.I.C., of St. John's University, Brooklyn, N. Y., has been appointed chairman of the Department of Pharmaceutical Chemistry.

Dr. Max Kronstein, F.A.I.C., research scientist, College of Engineering, New York University, New York, N. Y., presented a paper at the American Chemical Society meeting in San Francisco, Calif., on two new analytical techniques in the paint industry.

Dr. Isidore Kirshenbaum, F.A.I.C., research associate of Esso Research & Engineering Co., Linden, N. J., was co-author of a paper describing research (on by-products of the "Oxo Process") which resulted in an effective detergent.

(Continued on page 398)

Communications

A Collapse of Physics?

To the Editor:

In the article, "The Collapse of Time," by J. Lewis Powell (*THE CHEMIST*, July 1958), there seems to be a concomitant collapse of elementary physics. He states, "A Navy plane shot itself down by overtaking and colliding with its own bullets."

There must be others besides myself who have attempted to solve this problem on paper and failed. Could Mr. Powell furnish us with the muzzle velocity of the gun, the angle between the line of fire and the horizontal axis of the plane, as well as the angle of flight?

—William I. Harber, F.A.I.C.
Chicago 15, Ill.

On Confidential Relationship

To the Editor:

Replying to P. J. Gaylor's communication in *THE CHEMIST*, February 1958, it is believed the following complete quote from 108USPQ 294 (*Georgia Plywood case of 1956*) would be enlightening:

"Communications from a corporation to its house counsel dealing exclusively with technical engineering aspects of patent procurement are *not* privileged but privilege exists as to communications relating to counsel's participation in patent litigation." (*Italics added.*)

To understand the above statement it is necessary to go back to the landmark case of *U.S. vs. United Shoe*

Machinery Company 85USPQ5 (1950).

In order not to interpret this important case, the following quotations are cited therefrom:

(a) "Therefore, quite apart from the relationship of a person in the patent department of a corporation to the corporation is not that of attorney and client. Hence, the communication of a person in the patent department is as unprivileged as that of a lawyer who shares offices with his so-called client and gives him principally business but incidentally legal advice or an attorney who acts principally as an accountant and also renders legal advice on accounting data." (p. 7).

(b) "Some of the communications are claimed to be privileged as the 'work product of an employee acting in a legal capacity.' However, so far as appears, all these papers were prepared by lawyers in the patent department who by the preceding paragraph have been ruled not to be attorneys within the attorney client privilege." (p. 8).

In this connection it must be recalled that many non-lawyers, some of them patent attorneys and others patent agents, prosecute applications before the Patent Office. Hence prosecuting patent applications as stated in the *United Shoe Machinery case* is not legal work. Not being legal work, clearly no privilege attaches to it.

Wonderful Article

To the Editor:

Would it be possible to obtain . . . the May 1957 issue of *CHEMIST* with the wonderful article on education by Dr. Joel Hildebrand. His summation

of the status of "progressive education" and his recognition of how distorted theory has become through being pre-digested by professors of education are much needed contributions to the teacher education field . . .

—M. V. Wegrezyn
Bound Brook, N. J.

Please Note

To the Editor:

I appreciate reference made to my new assignment (p. 300, June Chemist). Please note, however, that my new appointment is as assistant plant manager of the Bound Brook Plant (of American Cyanamid Co.) and not of the Pharmaceuticals Manufacturing Department. I had formerly been manager of the Pharmaceuticals Manufacturing Department.

—Dr. A. Garrett Hill, F.A.I.C.
Bound Brook, N. J.

One of the Best

To the Editor:

The June issue of THE CHEMIST is one of the best issues you have published. Even though I heard the papers at the National Meeting, I was happy to read them . . . It is good to have all this from the National Meeting so soon after it actually took place. More power to you.

—Dr. Harry L. Fisher, Hon. AIC
Los Angeles 8, Calif.

Appreciated

To the Editor:

I enjoy reading THE CHEMIST and

am looking forward to receiving it again. Start my subscription with the January issue because everyone has been writing about how interesting it was to them . . .

—John J. Winkler
Newman, Ill.

What Creative Scientists Want

A five-year study of 67 research chemists in three industrial firms was recently reported by Morris I. Stein, associate professor of psychology and director of the Center for the Study of Creative and Mental Health, University of Chicago, Chicago, Ill.

The results of the study showed that the scientists (all Ph.D.'s), preferred as rewards for their achievements: (1) Substantial salary increase; (2) Promotion with increased scientific, rather than administrative, responsibility; (3) Increased opportunity to select their own problems; (4) More technical assistants, and (5) The opportunity to attend scientific meetings, where they could report on their work and keep abreast of late developments.

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By Dr. Rudolph Seiden, F.A.I.C.

Verlag Theodor Steinkopff, Dresden A 53: *Laboratoriumsbuch fuer den Lebensmittelchemiker*, by A. Beythien and W. Diemair; 7th ed., 744 pp. (65 ill.); DM 40.50.—The late Beythien's book has become the most indispensable of publications in the (German) food industry. It has now been revised and again improved by W. Diemair who added the newest practical, applicable physical-chemical methods of analysis to the well-known classical methods used in the determination of elements, enzymes, vitamins, as well as colors and preservatives, and of such food products as meats, eggs, milk products, fats and oils, seeds, flour, bread, yeast, fruit and vegetables, fruit juices, sugar, beverages, spices, tobacco, alkaloids, poisons, etc.

The Pharmaceutical Press, London WC1: *Mathematics and Statistics*, by L. Saunders and R. Fleming; 1957, 268 pp., 27s.6d.—The chapters on mathematics (from algebra to the theory of probability) fill about half the space of this short course which shows the mathematical derivations of statistical methods. Of special value to chemists and pharmacists are the chapters on statistical analysis, comparison of data by statistical methods, and application of statistics to biological assay or pharmaceutical problems. The book contains a variety of problems chosen from everyday experience.

Birkhaeuser Verlag, Basel: *16th International Congress of Pure and Applied Chemistry*; 1957, 355 pp.; sFr. 36.—The 18 main lectures on the latest developments in physical, inorganic, and organic chemistry given at this Congress (which was held in Paris in July 1957) are compiled in this official report. In English are the contributions by Seaborg, Norrish, Barrer, Brewer, Maddock, Bartlett, Nozoe, and Mason; in French those by Hinshelwood, Natta, de Groot, Ouellet, Nowotny (with Wittmann) and Terenin; in German are the lectures by Heraldsen, Wi-berg, Prelog, and Wittig. The lectures came from the U.S.A., England, Italy, Netherlands, Canada, Denmark, Germany, Austria, Switzerland, Japan, and USSR.

Ferdinand Enke Verlag, Stuttgart—W: *Chemie der Eiweisskoerper*, by E. Waldschmidt-Leitz; 2nd ed., 234 pp., DM 32.—The new edition of this monograph includes 663 literature references brought up to the end of the year 1955. It covers the most important aspects of protein chemistry with emphasis on building blocks, properties, hydrolysis, and structure of the proteins.

Verlag Dietrich Steinkopff, Darmstadt: *Biochemie der Ernährung*, by K. Lang; 1957, 426 pp., DM 54.—The fundamentals of nutritional biochemistry are here correlated and reviewed. Separate chapters are devoted to the carbohydrates, fats, cholesterol; protein, minerals, trace elements, and vitamins. The author succeeds in showing that quantitatively and qualitatively the nutritional requirements are dependent on metabolic processes. There are 654 references to literature to 1957.

Georg Thieme Verlag, Stuttgart: *Methoden der organischen Chemie*, by E. Mueller, Vol. I/1: *Allgemeine Laboratoriumspraxis I*; 4th ed., 1090 pp., (517 ill.); DM 198.—This is the ninth volume of the completely revised "Houben-Weyl"—perhaps the most noteworthy organic-chemical publication of the post-war years. 27 experts supplied the 29 articles on general laboratory practices which comprise the 1st part of volume I of this work. They deal with such problems as types of glass; glass apparatus, ceramics, metallic and plastic materials; storage of chemicals; supports for equipment; decanting and filtering; washing and decolorizing; the breaking of emulsions; extraction; crystallization; embedded compounds; complex and double compounds; salting out of compounds; adsorption processes; ion exchanger; redox resins; centrifuging; dialysis; electrophoresis; distillation and rectification; evaporation; vacuum sublimation; etc. The indexes fill 88 pp. Like its predecessors, this volume, too, is excellently illustrated and produced in a style worthy of its importance.

Govi-Verlag, Frankfurt a.M.: *Neue Betrachtungen zur Tablettenherstellung*, by H. Gebrecht; 1956, 168 pp.—The author discusses experimental work he did for his doctor thesis to improve the production methods of certain tablets.

Verlag Chemie, Weinheim/Bergstr.: *Das Dithizon und seine Anwendung in der Mikro- und Spurenanalyse*, by G. Iwantschew; 1958, 272 pp. (41 ill., 24 tables); DM 29.80.—Only dithiozone methods applicable to micro and trace analyses were included in this monograph. It describes dithiozone and its inner complex salts, the dithiozonates, analytical techniques, uses of dithiozone in qualitative and/or quantitative analysis of Ag, Hg, Pd, Pt, Au, Po, Cu, Bi, In, Sn, Zn, Cd, Co, Ni, Pb, Fe, Mn, Ti, group identification, and special uses of dithiozone in volumetric, emission spectral, polarographic, and chromatographic adsorption analyses. Prof. H. Fischer, who introduced dithiozone into analytical chemistry in 1925, wrote the introduction to this book.

Landwirtschaftsverlag Weser-Ems, Oldenburg: *Fortschritte in der chemischen Schädlingbekämpfung*, by W. Holz and B. Lange; 4th ed., 191 pp.; paperbound; DM 3.50.—A report on the current status of fungicides, insecticides, rodenticides, herbicides and other pesticides used in Germany.

Walter de Gruyter & Co., Berlin W 35: *Kesselspeisewasser*, by R. Freier; 1958, 202 pp. (95 ill.); DM 38.—An authoritative textbook on feed water for boilers, giving theoretical and practical information on the chemistry of water, technology of water treatment, and methods of chemical water analysis.

Verlag Volk und Gesundheit, Berlin C 2: *Insektizide heutzutage*, by W. Eichler; 1954, 590 pp. (87 ill.); DM 48.—37 experts review in 57 papers the entire field of insecticides. This splendid monograph covers history and chemistry of insecticides; methods of application; various uses; test procedures; biology and toxicology of the insecticides; etc. Literature and other indices fill 110 pp.

Walter de Gruyter & Co., Berlin W 35: *Lehrbuch der organischen Chemie*, by A. F. Holleman and F. Richter; 34th ed., 570 pp. (107 ill.); DM 28.—A new edition of the great Dutch chemistry teacher's widely acclaimed textbook which he first published in 1898. (See THE CHEMIST, January and November 1951 issues.)

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The 37th national convention of the American Association of Textile Chemists and Colorists will be held at the Conrad Hilton Hotel, Chicago, Ill., Oct. 30, 31-Nov. 1, 1958.

"Higher Education (in New Jersey): Present and Future," is featured in the March, 1958 issue of *NCE Today*, published by Newark College of Engineering, Newark, N. J.

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The Seventh Annual Conference on industrial applications of x-ray analysis will be held at the Albany Hotel, Denver, Colorado, August 13-15, 1958. It is sponsored by the Denver Research Institute, University of Denver.

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Dr. Glenn T. Seaborg, Hon. AIC, professor of chemistry, University of California, Berkeley, has been appointed to the Historical Advisory Committee of the Atomic Energy Commission, Washington 25, D. C.

Raymond Stevens, Hon. AIC, president of Arthur D. Little, Inc., Cambridge 42, Mass. announces the election of Gen. James M. Gavin as vice president and a director of the firm.

Leo Liberthson, F.A.I.C., technical director, Building Products Div., L. Sonneborn Sons, Inc., New York, N. Y., told the Concrete Specifications Institute recently that the use of polysulfide rubber as a sealant in building construction has become more popular because of new developments in structural practices.

William Callan, F.A.I.C., retired, has bought a farm at "April Hill," near Richmond, Mass. On its 270 acres is a fine trout stream.

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Ralph F. Celmer, F.A.I.C., has returned to Bath, N. Y., from Florida City, Fla., where he has completed an interim research assignment for the Department of Food Technology & Nutrition, University of Florida, Gainesville, on the utilization of green cull tomatoes.

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Starting Salaries

The director of placement at Lehigh University, Bethlehem, Pa., reports that the average starting salary for chemistry majors this June was \$485 a month, compared to \$434 in 1957. Chemical engineers received \$477 a month compared to \$460 a year ago.

The health Physics Society announces the following new officers: *President*, Dr. L. S. Taylor, National Bureau of Standards, Washington, D. C.; *President-elect*, Dr. E. E. Anderson, Oak Ridge National Lab., Oak Ridge, Tenn.; *Secretary*, J. W. McCaslin, Reactor Test Site, AEC, Arco, Idaho.

Chas. Pfizer & Co., Inc., Brooklyn, N. Y., in June inaugurated "Program 20" under which 20 upperclassmen from leading colleges will spend 10 weeks in the secondary oil recovery areas of the Southwest, demonstrating the use of citric acid as a sequestering agent where "iron plugging" of the sandface is a problem.

Stanley C. Hope, president of Esso Standard Oil Co., New York 19, N. Y. since 1949, is retiring. He plans to devote much of his time to highway safety, in which he has been active through the Esso Safety Foundation.

The Instrument Society of America will hold its 13th annual Instrument-Automation Conference and Exhibit, in Philadelphia, Pa., Sept. 15-19, 1958.

Items of Interest

"Do I Have Engineering Aptitude?" Questions and Answers for self-analysis, by Dr. A. Pemberton Johnson. Request from Dr. Frederick A. Russell, Meetings Secretary, Newark College of Engineering, Newark 2, N. J.

"Careers in Textile Chemistry." Brochure to be published by American Association of Textile Chemists and Colorists. For information: James A. Doyle, American Dyestuff Reporter, 44 E. 23rd St., New York 10, N. Y.

"Engineering Education Facilities—1957." (EJC Report No. 104). 25 cents. Engineering Manpower Commission, 29 W. 39th St., New York 18, N. Y.

"The Pharmaceutical Industry." By John O'Neill Closs. Career Monograph. \$1.00, Bellman Publishing Co., P.O. Box 172, Cambridge 38, Mass.

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"Professional Income of Engineers—1956." Report. \$1.50. Engineers Joint Council, 29 West 39th St., New York 18, N. Y.

"Successful College Recruiting . . ." Booklet prepared by Personnel Dept. of Diamond Alkali Co. Request copies from A. P. Schulze, Diamond Alkali Co., Cleveland 14, Ohio.

"Federal Support for Science Students in Higher Education." Statistical information. Office of the Director, National Science Foundation, Washington 25, D.C.

"Satisfying the Salaried Employee." Manual. 50 cents. Industrial Relations Div., National Association of Manufacturers, 2 E. 48th St., New York, N. Y.

"Industry's Betrayal of Basic Research." Booklet. Request from Executive Secretary, American Council of Independent Labs., Inc., 4302 East-West Highway, Washington 14, D. C.

"Proceedings of the 1957 National Industrial Research Conference." \$6.00. Armour Research Foundation, Illinois Institute of Technology, Chicago 16, Illinois.

"The Chemical Industry Facts Book." \$1.25. Manufacturing Chemists' Association, Inc., 1625 Eye St., N. W., Washington 6, D. C.

"The Hugh P. Baker Laboratory toward New Wealth from Wood." Brochure, State

University College of Forestry at Syracuse University, Syracuse 10, N. Y.

"The Man in the Doorway." 16 mm. sound and color film showing progress in chemical industry through selected Cyanamid operations. Produced as part of 50th Anniversary program. For information: Miss Norma Anderson, American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y.

"The Atom Comes to Town." 29 minute, 16-mm. sound, color motion picture film. Rental prints \$15.00 for 7 days or less. Audio-Visual Service Dept., Chamber of Commerce of the U. S., 1615 H St., N.W., Washington 6, D.C.

"Research—Key to Progress." 15-minute, 16-mm. color, motion picture film. Information. Public Relations Dept., Armour Research Foundation, 10 W. 35th St., Chicago 16, Ill.

"Mining for Nickel", 15 minute, 16-mm. sound, color motion picture film. No charge, if borrowed. Rothacker, Inc., 729 7th Ave., New York 19, N. Y.

"Aluminum Finishing." 15-minute, 16-mm. color and sound, motion picture. Available for free showing to technical groups. Information: Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, Calif.

"Nerve Gas Casualties and Their Treatment." 30-minute color film, sponsored by E. R. Squibb & Sons, division of Olin Mathieson Chemical Corp. For information, Federal Civil Defense Administration, Battle Creek, Michigan.

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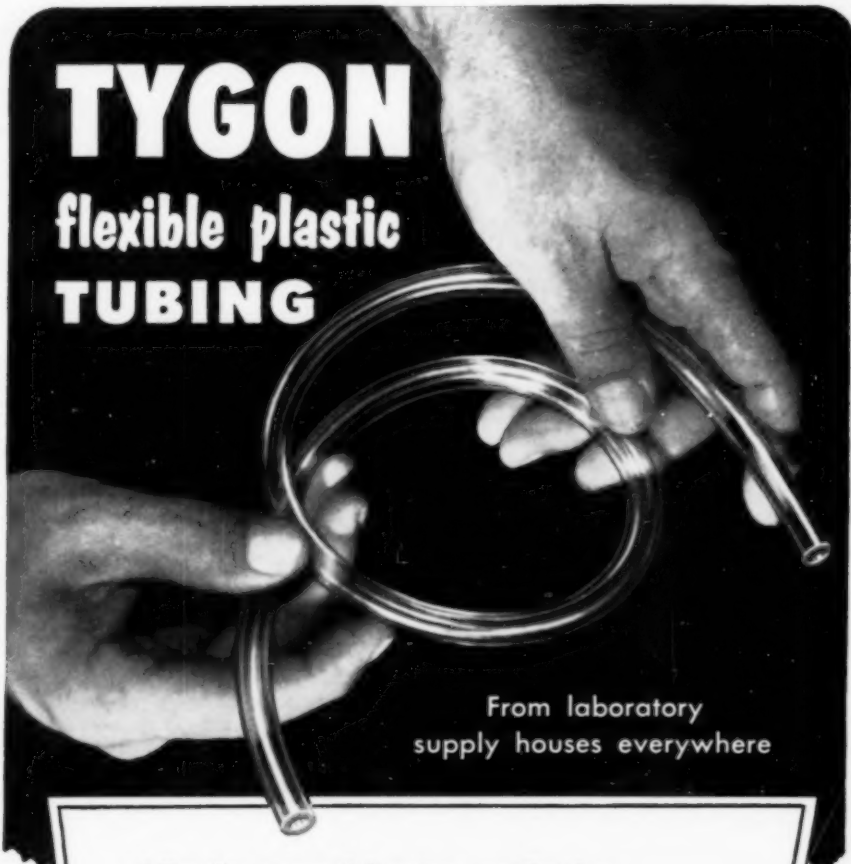


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